

Placing a High-Altitude Balloon in the Path of Totality

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Overview

The UAH Space Hardware Club has spent many years conducting high-altitude balloon flights for scientific, testing, and outreach purposes. During this time, we have refined our process to a concise set of equipment and procedures. While participating in the Eclipse Ballooning Project, we implemented these skills in the effort to obtain video and images during totality.

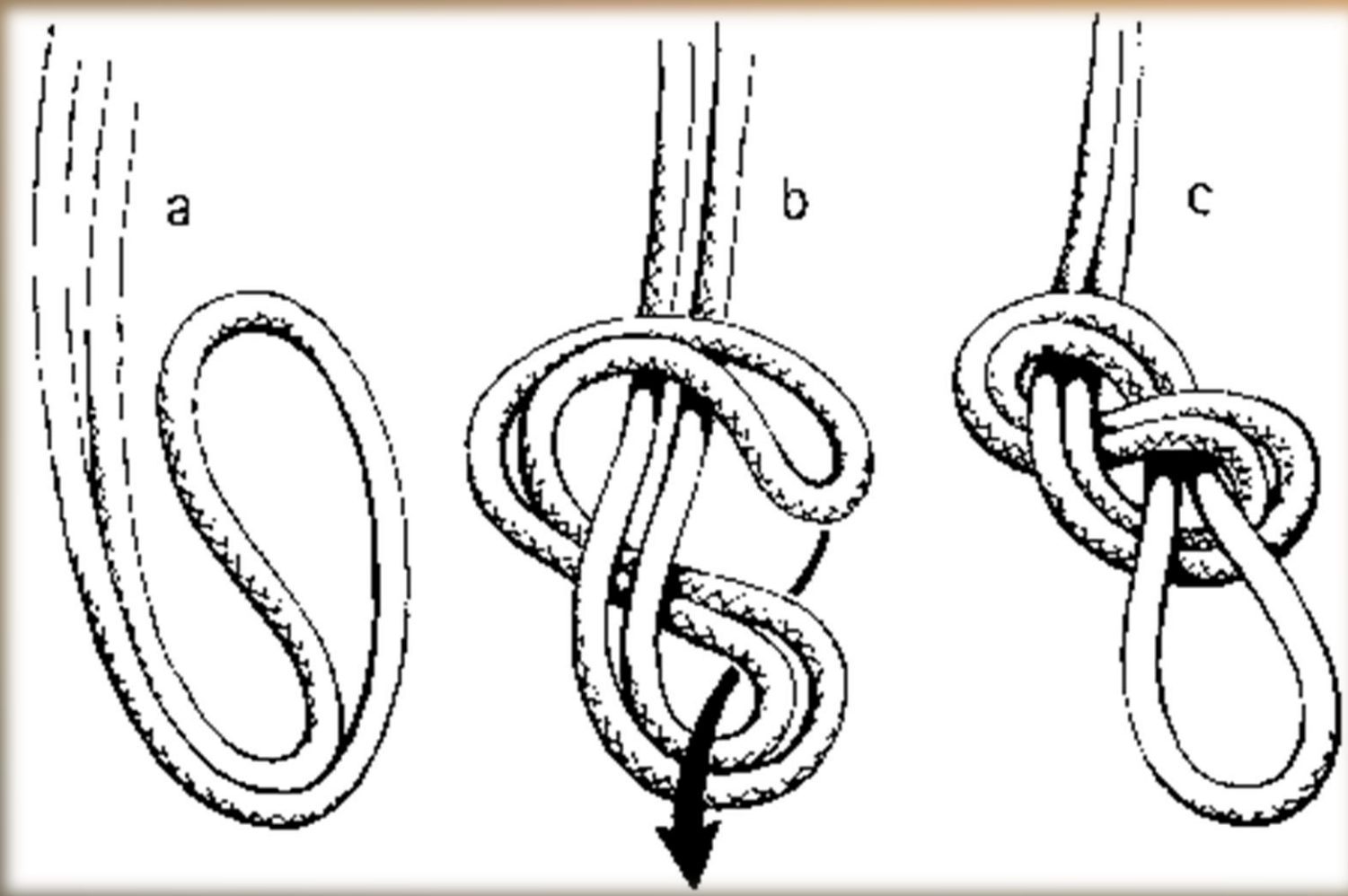
Fill



Our go-to setup for fill is: our in-house machined fill nozzle, two pipe clamps, a two stage regulator, twine, a fish scale and some Gorilla Tape. Filling a 1600 gram balloon can be accomplished with about 10 people under normal conditions or two people and a tarp on a calm day. We had remarkably low surface winds that day so we went with the latter.

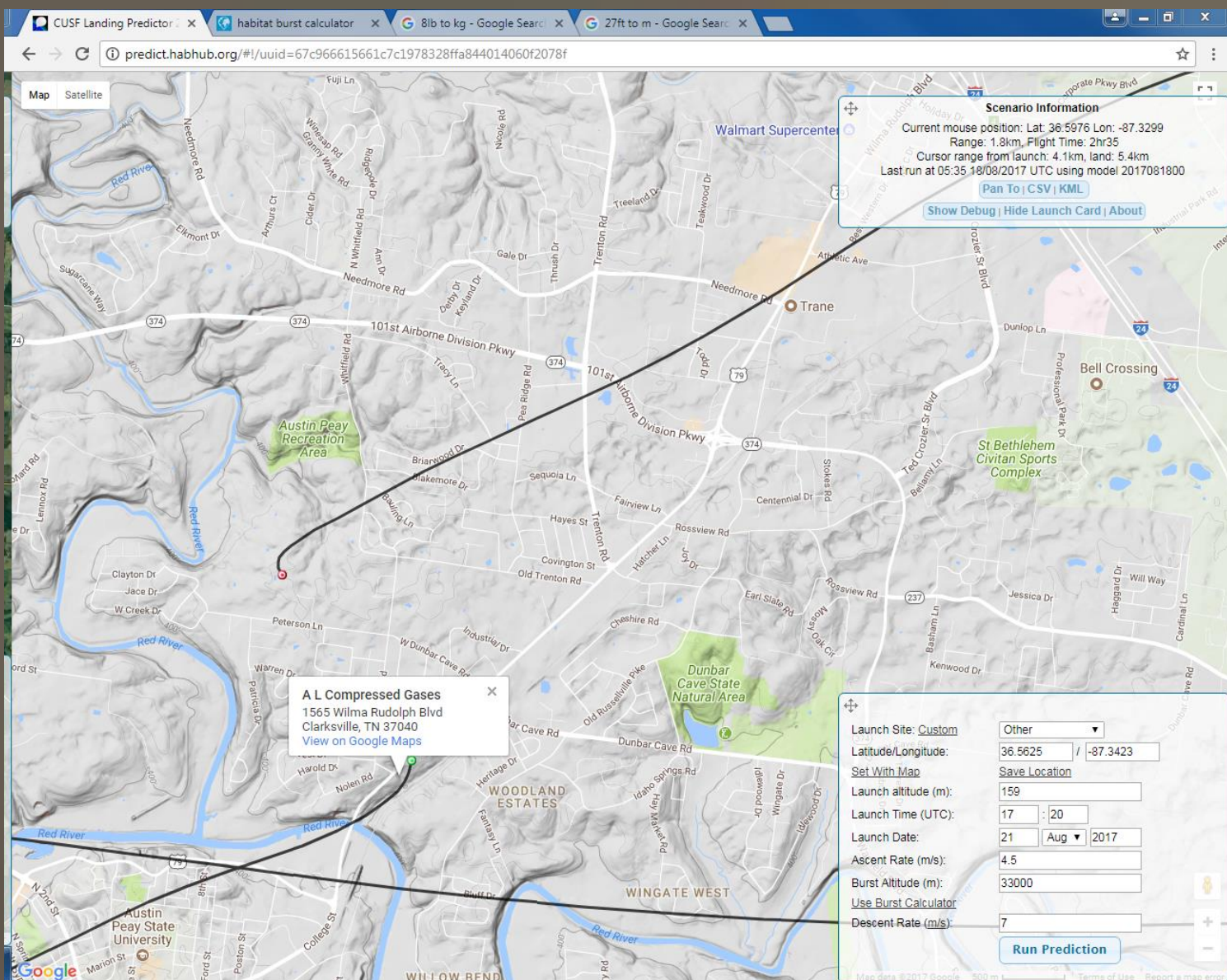
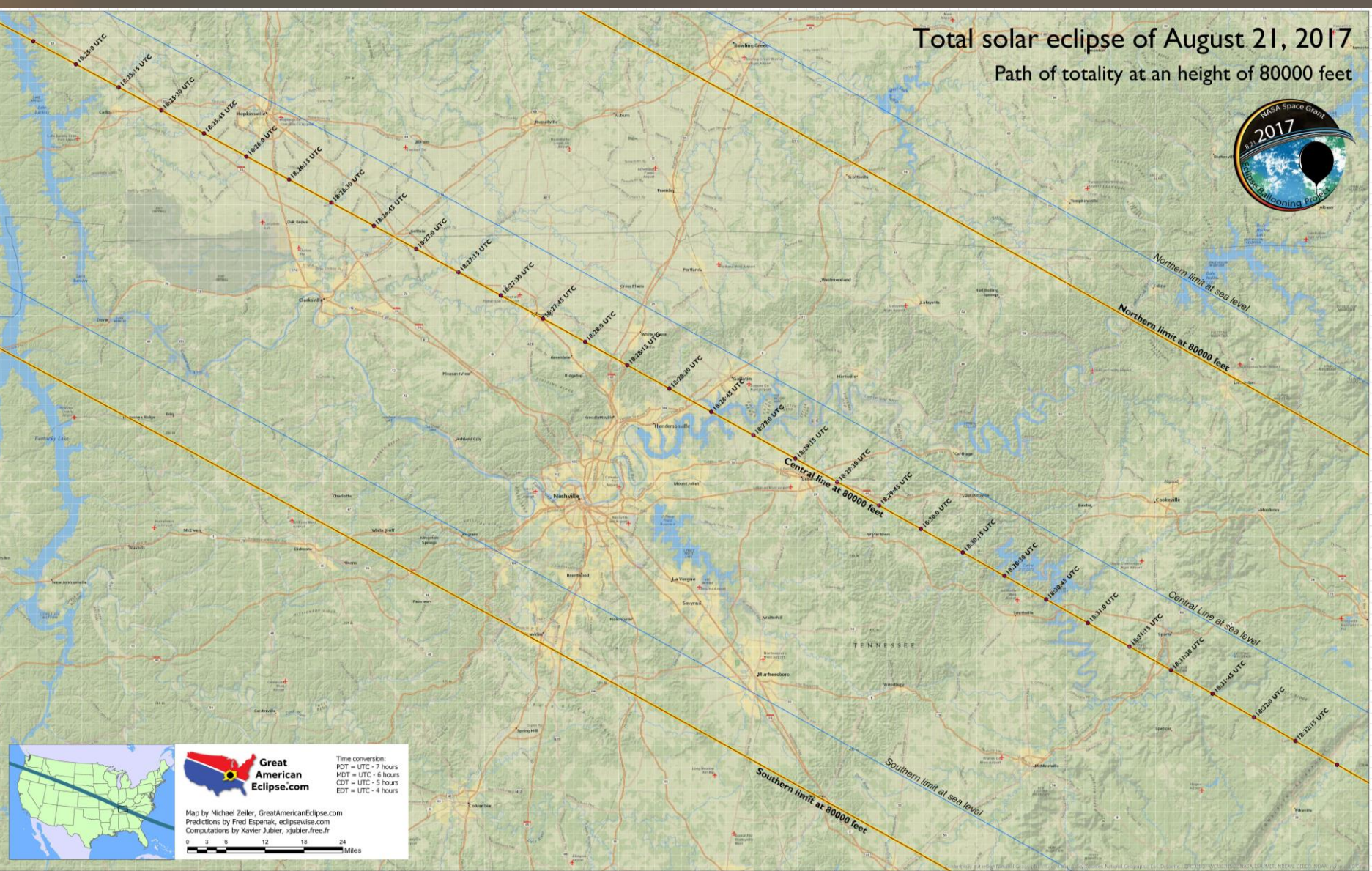


Once the balloon has been filled to the desired lift, we remove the nozzle and cinch the neck of the balloon with the twine. The loop of the handle line is then slid over the twine, and the neck is folded up and wrapped with gorilla tape.

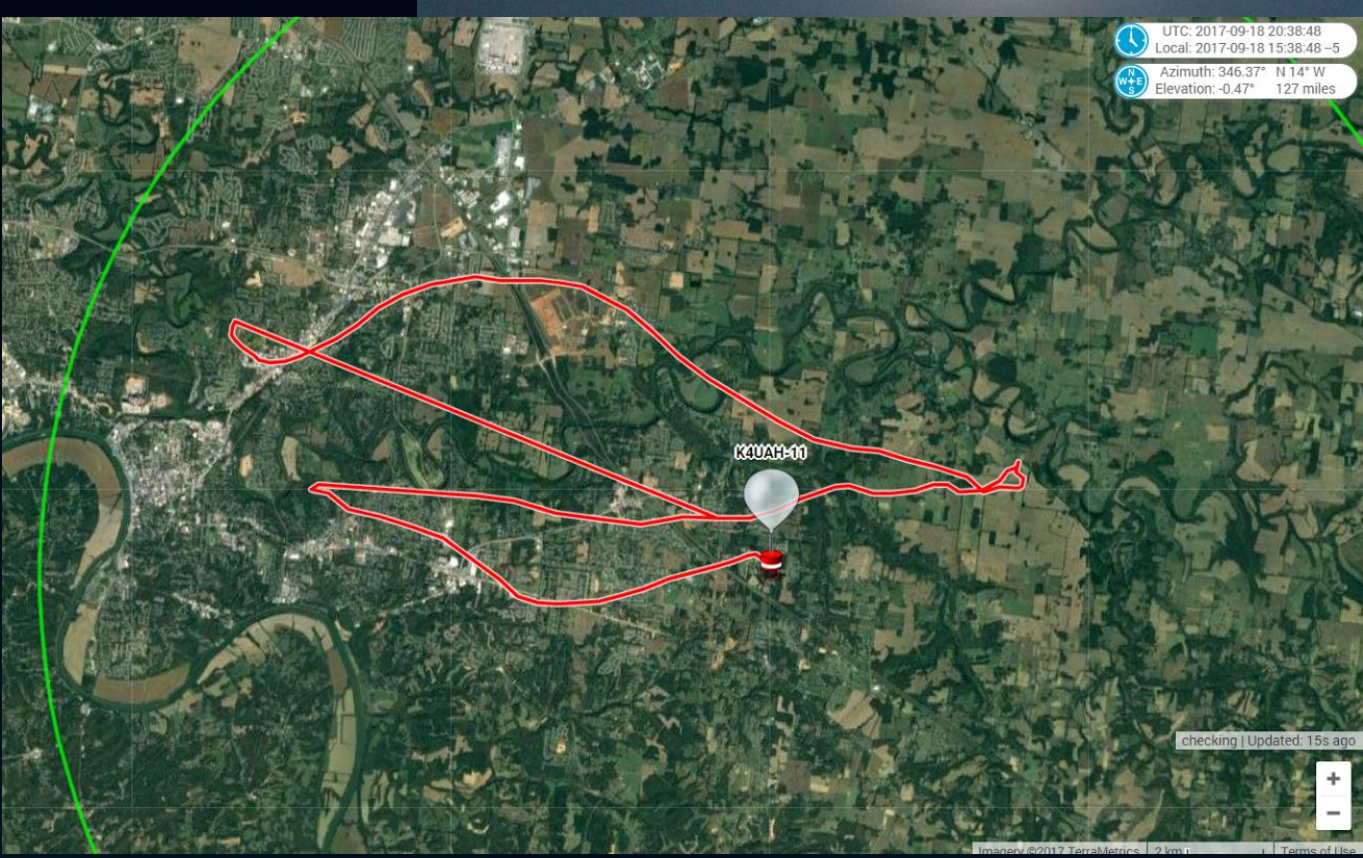


Prediction

In order to ensure flight in totality, we consulted a map of totality at 80K ft.. and past winds at 60K ft. during that time of year. Then, we selected a location to launch from. At T- 7 days, we began predictions using Habhub Burst Calculator and Landing Predictor. We then adjusted our net lift to synchronize our flight with totality.



Tracking

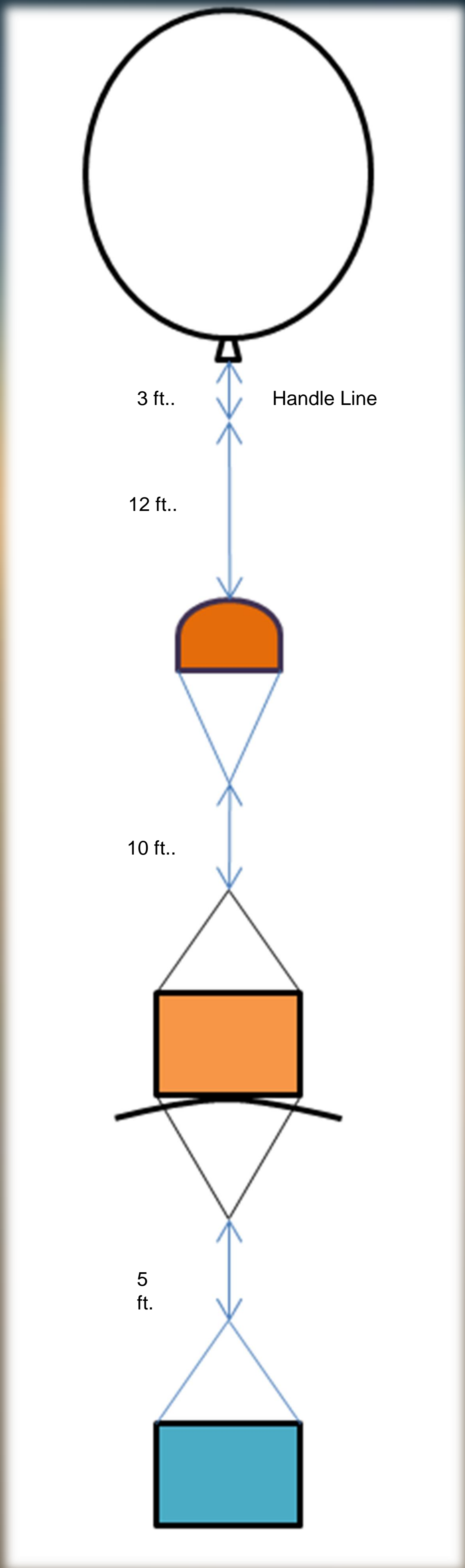


As a club, we are all fans of redundancy, especially for tracking. Our typical tracking setup consists of a Byonics Microtrack and a SPOT Trace. The Microtrack is a HAM radio APRS beacon, while the Trace is a commercial asset tracker. An APRS Beacon allows us the flexibility to track however is best for our scenario. We can track via online networks or by our own radios. In case of APRS failure, traces report via the SPOT website. They can last for days, but they do not report above 30K ft.

Line



Preparing the line can be the most time consuming process during the ballooning process. Since line mass must be accounted for in the predictions, we cut our lines to length the day before a flight. Lines are secured to payloads by figure of eight knots for maximum strength and security. We also make sure that there is at least 15 ft. between parachute and the balloon to prevent parachute fouling.



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